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BEET LEAFHOPPER CONTROL IN SOUTHERN IDAHO BY SEEDING BREEDING AREAS TO RANGE GRASS [1]

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INTRODUCTION

The beet leafhopper (*Circulifer tenellus* (Baker)) is known in many of the arid and semiarid agricultural areas of the West, where relatively low humidity and high summer temperatures prevail and curly-top-susceptible crops are grown. It is the sole known vector of the virus of curly top, which is a limiting factor in growing several crops in southern Idaho. This insect and the disease it carries are an annual threat and potential menace to a well-established and nationally important agricultural industry — the growing of garden or snap beans for seed. Most varieties grown are susceptible to curly top.

The beet leafhopper in southern Idaho breeds and maintains itself in large desert and range areas along the Snake River Plains, primarily in those areas that have been burned over, or so abused that establishment of weed host plants of the beet leafhopper is possible. Major portions of these areas are on public domain, and for that reason, agencies of the Federal Government representing the U.S. Department of the Interior and the U.S. Department of Agriculture, have an interest in the problem and in measures directed toward its solution.

All grasses are nonhosts of the beet leafhopper. The most important overwintering and spring weed hosts in southern Idaho are broad-leafed annual plants, such as dwarf phlox (*Microsteris gracilis* (Dougl. ex Hook.) Greene), flixweed (*Descurainia sophia* (L.) Webb.), green tansymustard (*D. pinnata filipes* (A. Gray) Detling), mousetail (*Myosurus aristatus* (Benth.)), perfoliate peppergrass (*Lepidium perfoliatum* L.), and tumblemustard (*Sisymbrium altissimum* L.). These weeds ordinarily germinate in the fall in desert, range, and waste areas. Adult beet leafhoppers survive on them through the winter and produce a generation the following spring. Russian-thistle (Salsola kali var. tenuifolia Tausch) is the most important summer weed host upon which the insect lives from late spring or early summer until late fall, when the plant dries and becomes unsuitable as a host, or is killed by frost.

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It has been felt for many years that breaking the host-plant cycle of this insect in its desert and range breeding areas would be an effective control practice. The most logical approach is to control Russian-thistle rather than the fall-germinated host plants, since the acreage of Russian-thistle is much smaller.

Downy brome (Bromus tectorum L.), more commonly known in Idaho as cheatgrass, Bromus, or downy chess, is effective as a nonhost when present but has several undesirable characteristics. It is an annual grass, and its appearance each year as a range cover is dependent upon its effectively reseeding itself each season. Reseeding may or may not occur, depending upon climatic factors. This plant is suitable as forage for cattle and sheep for only a short period, since it matures and dries in early or midsummer. After drying, the cheatgrass becomes a potential fire hazard on the range. Furthermore, in any season, certain conditions, including sufficient rainfall at a critical period in late spring or early summer, may result in replacement of cheatgrass by Russian-thistle. For these reasons, the best solution to cultural control of the beet leafhopper appears to be the replacement of cheatgrass range areas, which are also potential Russian-thistle areas, as well as the actual acreages of Russian-thistle, with suitable perennial range grass.

THE PROGRAM

For the fiscal year 1959, Congress made available to the Bureau of Land Management of the U.S. Department of the Interior $300,000 for use in initiating a program to control the beet leafhopper in southern Idaho by seeding its summer breeding areas in desert and range lands with suitable perennial range grass. At that time, it was estimated that this money would be sufficient to cover the cost of seeding and fencing approximately 35,000 acres to replace Russian-thistle and cheatgrass. Control of the leafhopper in southern Idaho would require the successful seeding of approximately 300,000 acres, which seeding would require a similar annual expenditure over an 8-year period. The seeded areas would need to be maintained by controlled grazing and some reseeding. Additional funds were made available by Congressional action for continuation of the program in the fiscal years 1960-62.

In the conduct of this program, the Plant Pest Control and Entomology Research Divisions of the U.S. Department of Agriculture and the Idaho Bean Commission cooperated informally in an advisory capacity with the Bureau of Land Management. This cooperation was accomplished by the establishment of an advisory committee, which held its first meeting June 17, 1958. The committee was composed of representatives of each of the above agencies and interested range users who graze cattle and sheep in the affected areas. The committee has met two or three times a year to advise where seeding would be most helpful in the control of the beet leafhopper with the least adverse effect on range users. It has also attempted to solve problems that have arisen and to evaluate the progress of the program.

PROGRESS

The total amount of money provided during the fiscal years 1959 to 1962, inclusive, was $750,000. During this period, approximately 116,000 acres were seeded, primarily with crested wheatgrass (*Agropyron cristatum* (L.) Gaertn.), which, to date, has been the mainstay of this program. The seedings have been only partially successful for reasons that will be discussed later.

Seeding costs have varied with the type of preparation necessary before the actual seeding operation. The least expensive seeding is that which follows a fresh clean burn (an uncontrolled or wild burn with no expense involved in containing the fire), where all that is required is the drilling operation. Seed cost is currently estimated at approximately 32¢ per pound, and between 5 and 6 pounds of seed per acre are ordinarily drilled. The cost of seed plus drilling is about $3.25 per acre. When controlled burning is done prior to seeding, the cost is about $3.75 per acre; when sage brush is sprayed with an herbicide and then the seed is drilled, the cost approximates $5.50 per acre; and when plowing is done, followed by seeding, the cost is about $6.00 per acre. These figures do not include the cost of protective fences and cattle guards where they are needed. The cost of seeding the 116,000 acres to date is approximately $5.50 per acre.

DISCUSSION

As is to be expected in a program of this nature and magnitude, many problems and difficulties have arisen, and as a result, many of the individual seedings have not been successful. Crested wheatgrass is most effectively seeded in the fall in southern Idaho and, like many similar perennial range grasses, it is relatively slow in germinating. Timely fall rains following seeding and adequate winter moisture are essential to good germination and satisfactory emergence the following spring. Inadequate soil moisture at these critical times favors the development of cheatgrass, which germinates quickly, producing large numbers of plants in the late fall that deplete available moisture and reduce the chances of succesful germination of the crested wheatgrass. This annual cheatgrass has proved a most rugged and determined competitor for soil moisture in the struggle for existence among the natural and seeded desert plants and grasses. Various methods of eliminating it as a competitor with the seeded crested wheatgrass are being tried. These methods range from experimental chemical control to the use of specialized types of equipment for drilling the seed. Elimination, or at least the reduction of a large percent of viable seed or established cheatgrass plants seems to be essential in some areas if a stand of crested wheatgrass or other suitable perennial range grass is to be obtained.

In some areas where controlled burning has been practiced, or the soil has been plowed prior to seeding, the topsoil has shifted or blown elsewhere, even when winds were only moderate. This shift of soil is most undesirable for it may result in the uncovering and exposure, or the deep burying, of planted seed with resultant failure of germination or plant emergence. Furthermore, repercussions have come from some nearby urban communities regarding the undesirable dust clouds incident to soil movement.

Many individuals with interests in cattle and sheep pay for grazing privileges on the public domain. A seeding program such as this usually requires the protection of newly seeded areas, involving a period of nonuse for perhaps two or three seasons; sometimes fencing is necessary. Such a nonuse program should be planned so that the necessary adjustments that must be made by the grazing interests are kept at a minimum. However, a benefit has resulted from this practice of nonuse in some areas particularly where protective fences have been provided. Some of the native grasses that had been depleted almost to the point of extinction have begun to reseed and reestablish themselves, and help to provide suitable, perennial, range-grass cover. Perhaps some adjustments in range-management practices will help to maintain these native grasses as a permanent part of the range cover when grazing has been reestablished.

Rabbits have damaged newly established seedings by feeding on the tops of the plants. Chemical repellents have been used against them with some success. Various species of armyworms and cutworms, particularly the army cutworm (*Chorizagrotis auxiliaris* (Grote)), have also occasionally damaged newly established seedings by feeding on both tops and roots of the plants. It was necessary for the Bureau of Land Management to reseed approximately 5,000 acres of this project in 1960 because of destruction of the original seeding by the army cutworm.

In one of the desert breeding areas of the beet leafhopper south of Glenns Ferry, Idaho, that had been seeded to crested wheatgrass in the fall of 1959, 10 to 12 army cutworm larvae per foot of drill row were found the following summer. There was a very poor stand of crested wheatgrass in this area, which was originally attributed to cheatgrass competition and drought, but it is very likely the army cutworm was at least partially responsible. Army cutworm infestations of outbreak proportions are likely to develop in the breeding areas if the rainfall reaches 4 inches or more during September and October. Such precipitation creates moisture conditions favorable for crested wheatgrass germination. Thus, an acute insect problem may develop concurrently with germination and growth of the young plants.

There are many benefits to be realized from successfully accomplishing such a seeding program. It will certainly be helpful in reducing to a minimum the menace to nearby cultivated lands of an insect-plant-virus-disease complex. This is its main objective, but such a program will contribute other benefits to the economy of the area where it is successfully accomplished.

The increased carrying capacity of a good crested wheatgrass range over unseeded cheatgrass and sagebrush range is shown by the following: Cheatgrass is rated at 10 to 40 acres per AUM, whereas crested wheatgrass is rated at 2 to 4 acres per AUM and sometimes can be grazed even more heavily. (An AUM is an animal unit per month, a term used in estimating the carrying capacity of ranges.) In addition, crested wheatgrass has a very low fire hazard potential compared with cheatgrass, which matures and dries early in the summer and is annually a great fire hazard to large range areas. Furthermore, a suitable perennial range grass, such as crested wheatgrass, affords much better protection to the soil against erosion than do annual plants and grasses, and provides more reliable and stable forage production. Cheatgrass production varies tremendously from year to year and, therefore, it is not a dependable species for a continuing and stable forage supply.

With the advantages listed, plus others that will doubtless appear, the effort being made in this seeding program is worthwhile and should be continued to completion.